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**A Study On Glitches Involved In The Frozen Chain Management In Coimbatore District**

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**Abstract**

A cold chain or frozen chain is a temperature-controlled supply chain. An uninterrupted cold chain is never-ending series of refrigerated production, storage and distribution activities, along with associated apparatus and logistics, which maintain a desired low- temperature range. It is used to preserve and to extend and ensure the shelf life of products, such as fresh agricultural produce,seafood, frozen food, photographic film, chemicals, and pharmaceutical drugs. Such products, during transport and when in temporary storage, are sometimes called cool cargo. Unlike other goods or merchandise, cold chain goods are perishable and always enroute towards end use or destination, even when held temporarily in cold stores and hence commonly referred to as cargo during its entirelogistics cycle. frozenchain logistics includes all of the means used to ensure a constant temperature for a product that is not heat stable, from the time it is manufactured until the time it is used. Moreover, frozen chain is considered as a science, a technology and a procedure. It is a science as it requires the understanding of the chemical and biological processes associated with product perishability. It is a technology as it relies on physical means to ensure desirable temperature conditions along the supply chain. It is a process as a series of tasks must be executed to manufacture, store, transport and monitor temperature sensitiveproducts.

**Keywords**: Frozen chain, Refrigerated, Temperature, Supply chain, Logistics,

**Introduction**

A Cold Chain is a temperature controlled supply chain cold storage and distribution in which agricultural produce are preserved afresh and shelf-life is extended for a longer period of time. With increasing food demand and changing lifestyle, Cold Chain has become the focal point for the government and investors. This industry facilitates long distance transport of various products and makes seasonal products available for the entire year. It’s a kind of linkage between the farmers and consumers. This integrated system helps in maintaining quality in terms of nutritive value, crispness, freshness, taste and appearance.

**Industries Covered Under Frozenchain**

The major industries covered under cold chain are:

1. Agriculture, Horticulture &Floriculture
2. Dairy
3. Confectionary
4. Pharmaceutical
5. IndustrialChemicals
6. Poultry and MeatProcessing

**Objectives of the study**

* To know about the various technologies and services offered by the Frozenchain providers.
* To study about the factors influencing export of Frozen chain oriented goods and technologies.
* To find the existing market challenges relating to cold chain in frozen food and medicine caring inIndia.
* To study about the differentglitches faced by the Frozenchainmanagement.

**Researchmethodology**

**Sample Size**

The sample size is certified to its nature of data collection. Data collection is used on primary data. Samples of 150 respondents are taken for this study.

**Statistical Tools**

The collected data were classified, tabulated and analysed with some of the statistical tools listedbelow:

* Simple PercentageAnalysis
* Ranking
* Chi – square
* CorrelationAnalysis

**Limitations Of Thestudy**

* The result cannot be generalized due to the study is confined to the respondents in Coimbatoreregion.
* The sample size was only 150, and the validity of the data depends on the responses of therespondents.

**Review Of Literature**

**1.**Bharti, Apeejay**, (2014)** ―Growthin worldwidereefer trade and frozenchain challenges‖ states that the share of containerised refrigerated transport capacity as a percentage of the total international transport capacity in marine shipping increased from 33% in 1980 to 72% in 2013. Outdated refrigerated ships have therefore been replaced by reefer containers using conventionalcontainer ships, the majority of which have power outlets able to accommodate reefer containers. This also brought about a shift from the need to handle refrigerated cargo at specialised ports or terminals with cold storage space, to being able to service reefer containers through standard container terminals.

**2.**NCCD,  **(2013)** ―logistics and retail managementEnumerated that frozen chains have been evolving since 1980s. Earlier, frozen chainssimply meant storing at a specific temperature in warehouses and refrigerated vehicles. There was no awareness of assimilating the supply chain links and as a result billions’ of dollars’ worth of losses occurred every year.

3.Fernie.JohnandSparksLeigh.(2004)―Theinfluenceofreducingfoodlossin the globalcold chainstates that they have stated that the latter problems require a motivated and trained workforce, which is often a challenge, and is one of the key interventions required, especially in developing countries, to improve cold chainmanagement.

**Data Analysis And Interpretation**

Table - 1

|  |  |  |  |
| --- | --- | --- | --- |
| Profile | Factor | No.of respondents | Percentage |
| **Types of concern** | **Sole Proprietor** | 79 | 53 |
| **Partnership** | 32 | 21 |
| **Public Limited** | 5 | 3 |
| **Private limited** | 34 | 23 |
| **Experience in the field** | **Less than 3 yrs** | 5 | 3 |
| **3-5 yrs** | 44 | 29 |
| **6-10 yrs** | 32 | 21 |
| **Above 10 yrs** | 69 | 46 |
| **Major destination** | **United States of America** | 12 | 8 |
| **United Kingdom** | 27 | 18 |
| **European countries** | 18 | 12 |
| **Middle East countries** | 19 | 13 |
| **Asian countries** | 74 | 49 |
| **Operation frequency** | **Daily** | 13 | 9 |
| **Twice a week** | 37 | 25 |
| **Weekly once** | 37 | 25 |
| **Based on contract** | 63 | 42 |
| **Mode of transportation** | **Seaways** | 77 | 51 |
| **Airways** | 20 | 13 |
| **Both** | 53 | 35 |
| **Preferred seaport** | **Cochin** | 45 | 30 |
| **Chennai** | 47 | 31 |
| **Tuticorin** | 35 | 23 |
| **Mumbai** | 3 | 2 |
| **Not interested in seaport** | 20 | 13 |
| **Most handled goods** | **Perishable** | 21 | 14 |
| **Medical** | 12 | 8 |
| **Dairy products** | 10 | 7 |
| **Meat & poultry products** | 9 | 6 |
| **Food stuffs** | 18 | 12 |
| **Beverages** | 14 | 9 |
| **All the above** | 66 | 44 |
| **Bank loan facilities** | Yes | 45 | 30 |
| No | 105 | 70 |
| **Type of package** | **Corrugated Fibre boards** | 5 | 3 |
| **Crates** | 14 | 9 |
| **Paper & Mesh bags** | 23 | 15 |
| **Pallets** | 30 | 20 |
| **Shrink Wraps** | 19 | 13 |
| **Palletized Containers** | 59 | 39 |
| **Storage temperature** | **Chill (0`c to 10`c)** | 13 | 9 |
| **Mild Chill (10`c to 20`c)** | 39 | 26 |
| **Frozen (below 18`c)** | 36 | 24 |
| **Normal (>20`c)** | 62 | 41 |
| **Cold storage facility** | **Reefers** | 20 | 13 |
| **Blast Freezing** | 13 | 9 |
| **Freeze Drying** | 28 | 19 |
| **Evaporative Coolers** | 44 | 29 |
| **Trailer Mounted** | 20 | 13 |
| **Insulated Pallets** | 25 | 17 |
| **Certificate required** | **Certificate from APEDA** | 16 | 11 |
| **Phytosanitary Certificate** | 21 | 14 |
| **NOC Plant Quarantine** | 30 | 20 |
| **All the above** | 83 | 55 |
| **Cold chain technology** | **Dry Ice** | 16 | 11 |
| **Gel Packs** | 20 | 13 |
| **Liquid Nitrogen** | 22 | 15 |
| **Crushed/ Slurry Ice** | 34 | 23 |
| **Quilts** | 19 | 13 |
| **Reefers** | 39 | 26 |
| **Association** | **ASSOCHAM** | 12 | 8 |
| **FCAOI** | 13 | 9 |
| **NCCD** | 40 | 27 |
| **AIFPA** | 36 | 24 |
| **MOFPI** | 25 | 17 |
| **AFTPAI** | 24 | 16 |
| **Pre-Cooling techniques** | **Using Ice** | 15 | 10 |
| **Hydro-Cooling** | 73 | 49 |
| **Vacuum Cooling** | 11 | 7 |
| **Forced Air Cooling** | 8 | 5 |
| **All the above** | 43 | 29 |
| **Problems face in customs** | **Different Geographical Regions** | 15 | 10 |
| **Average Approval Time** | 6 | 4 |
| **Necessary Documents** | 42 | 28 |
| **Proper Packing** | 63 | 42 |
| **Stuffing** | 24 | 16 |
| **Aware of Smart-Trace Solutions** | **Aware** | 48 | 32 |
| **Not Aware** | 102 | 68 |
| **Market issues & obstacles** | **Lack of knowhow & trained manpower** | 17 | 11 |
| **Lack of backward & forward linkages to supplement cold chain** | 7 | 5 |
| **Lack of trust concerning viability of cold chain projects** | 21 | 14 |
| **High capital investment** | 25 | 17 |
| **High operational costs due to high cost of power** | 28 | 19 |
| **Problems of optimization in reefer transport** | 43 | 29 |
| **High insurance/ Risk coverage premiums** | 9 | 6 |

**Ranking Method**

Table: 2Showing the ranking of problems faced in export of Frozen chain goods

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROBLEMS** | **PROBLEM FACED IN EXPORT** | | | | | | | | | | | | **Total** | **Rank** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Documentation Procedure** | 12 | 24 | 63 | 48 | 60 | 54 | 126 | 120 | 108 | 120 | 99 | 72 | 906 | **6** |
| **Customs Clearanc& Inspection** | 18 | 36 | 45 | 36 | 105 | 54 | 168 | 72 | 189 | 0 | 66 | 0 | 789 | **5** |
| **Freight Charges** | 6 | 60 | 72 | 84 | 75 | 108 | 42 | 96 | 54 | 30 | 66 | 36 | 729 | **2** |
| **Transportation** | 3 | 42 | 27 | 60 | 105 | 108 | 63 | 120 | 81 | 90 | 132 | 108 | 729 | **2** |
| **Packing** | 15 | 54 | 72 | 84 | 90 | 0 | 84 | 144 | 54 | 0 | 66 | 30 | 693 | **1** |
| **Govt.**  **Restrictions**  **& Regulations** | 6 | 18 | 45 | 84 | 60 | 72 | 84 | 96 | 81 | 90 | 231 | 144 | 1011 | **10** |
| **Import Restriction in BuyersCountry** | 18 | 24 | 45 | 60 | 135 | 108 | 84 | 72 | 108 | 60 | 30 | 36 | 780 | **4** |
| **Labour Shortage** | 6 | 6 | 9 | 12 | 60 | 162 | 126 | 164 | 81 | 150 | 132 | 252 | 1160 | **12** |
| **Power Cuts** | 12 | 24 | 36 | 60 | 60 | 72 | 63 | 120 | 81 | 90 | 165 | 216 | 999 | **9** |
| **Warehousing** | 15 | 42 | 36 | 36 | 60 | 54 | 63 | 96 | 108 | 120 | 165 | 144 | 939 | **8** |
| **Timely Despatch of Cargos** | 6 | 54 | 45 | 48 | 60 | 54 | 63 | 96 | 108 | 90 | 165 | 144 | 933 | **7** |
| **ContaineHandlingCharges** | 9 | 18 | 63 | 36 | 45 | 54 | 80 | 96 | 108 | 150 | 165 | 216 | 1040 | **11** |

**Source:** Computed Data

Table: 3 Showing the rank of challenging factors stands apart from other distribution providers

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROBLEMS** | **FACTORS INFLUENCES THE EXPORT** | | | | | | | | | | **Total** | **Rank** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **Skilled & CheapLabour** | 15 | 48 | 18 | 12 | 75 | 144 | 63 | 96 | 189 | 200 | 860 | **10** |
| **Good Transport Facility** | 21 | 12 | 45 | 48 | 120 | 72 | 21 | 72 | 243 | 210 | 864 | **9** |
| **Strong Financial Base** | 6 | 54 | 45 | 84 | 30 | 108 | 84 | 192 | 54 | 150 | 807 | **5** |
| **Well Connected Ports** | 15 | 72 | 18 | 24 | 120 | 72 | 0 | 72 | 216 | 180 | 789 | **4** |
| **Availability of Proper Infrastructure** | 27 | 18 | 45 | 36 | 75 | 18 | 126 | 48 | 243 | 210 | 846 | **7** |
| **Stuffing & De-stuffing** | 15 | 48 | 18 | 84 | 15 | 18 | 168 | 144 | 135 | 210 | 855 | **8** |
| **Subsidies Received from Government** | 39 | 30 | 63 | 24 | 60 | 18 | 21 | 210 | 135 | 90 | 690 | **2** |
| **Well Equipped Storage Facilities** | 18 | 66 | 45 | 84 | 30 | 36 | 180 | 120 | 81 | 0 | 660 | **1** |
| **Handling Techniques** | 24 | 12 | 99 | 84 | 45 | 54 | 105 | 24 | 108 | 180 | 735 | **3** |
| **Re-Distribution Centres** | 6 | 42 | 81 | 60 | 30 | 72 | 42 | 216 | 135 | 150 | 834 | **6** |

**Source:** Computed Data

Table: 4Showing the rank of difficult involved in air cargo of cold chain

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROBLEMS** |  | **FACTORS INFLUENCES THE AIR CARGO** | | | | | | **Total** | **Rank** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **Pallet Temporary Storage until Flights Actual Departure** | 70 | 50 | 60 | 40 | 0 | 90 | 28 | 338 | **1** |
| **Products Transported from Warehouse to Ramp** | 0 | 8 | 60 | 60 | 200 | 150 | 280 | 758 | **7** |
| **Product Loading Process to the Aircraft** | 5 | 100 | 60 | 100 | 100 | 90 | 105 | 560 | **3** |
| **In-Flight Temperature Setting Process** | 10 | 80 | 60 | 80 | 25 | 260 | 70 | 590 | **4** |
| **At Destination off- loading of the products from the Aircraft** | 0 | 10 | 105 | 40 | 225 | 150 | 210 | 740 | **6** |
| **Products Transportation through Airport Cargo to the Airport Warehouse** | 0 | 10 | 105 | 40 | 225 | 150 | 210 | 490 | **2** |
| **Temporary Storage of the products in the Airport Warehouse till the final pickup from the Airport Warehouse** | 10 | 30 | 60 | 160 | 100 | 60 | 245 | 665 | **5** |

**Source:** Computed Data

Table: 5 showing the factors affecting the effectives of cold chain

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROBLEMS** | **FACTORS AFFECTING COLD CHAIN** | | | | | | | | | | | | | | **Total** | **Rank** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| **Pre-Coding Facilities** | 35 | 40 | 45 | 40 | 50 | 60 | 105 | 40 | 40 | 0 | 0 | 60 | 130 | 145 | 790 | **1** |
| **Refrigerated Carriers** | 20 | 30 | 30 | 20 | 20 | 90 | 70 | 200 | 45 | 50 | 160 | 60 | 0 | 210 | 1005 | **3** |
| **Packing** | 15 | 10 | 30 | 40 | 75 | 30 | 30 | 160 | 90 | 100 | 165 | 60 | 195 | 140 | 1140 | **7** |
| **Warehousin g** | 15 | 40 | 0 | 100 | 50 | 90 | 105 | 0 | 135 | 100 | 55 | 120 | 60 | 70 | 940 | **2** |
| **Long Complex Clearance**  **Procedures** | 10 | 40 | 60 | 0 | 25 | 30 | 0 | 40 | 315 | 50 | 165 | 120 | 195 | 70 | 1120 | **6** |
| **Infrastructural Facilities** | 15 | 40 | 45 | 20 | 0 | 30 | 0 | 0 | 45 | 200 | 275 | 120 | 65 | 350 | 1205 | **11** |
| **Airlines Not Providing Sufficient**  **Facilities** | 20 | 0 | 10  5 | 100 | 0 | 0 | 35 | 0 | 90 | 100 | 160 | 60 | 130 | 210 | 1010 | **4** |
| **Power Supply** | 0 | 40 | 30 | 40 | 50 | 30 | 0 | 120 | 45 | 250 | 275 | 120 | 130 | 70 | 1200 | **10** |
| **High Maintenance Charges** | 0 | 20 | 15 | 120 | 50 | 90 | 0 | 0 | 45 | 150 | 165 | 300 | 65 | 210 | 1230 | **12** |
| **Under Capacity Of Chambers** | 0 | 10 | 45 | 20 | 100 | 0 | 0 | 40 | 270 | 200 | 0 | 240 | 260 | 140 | 1325 | **13** |
| **High Labour Intensive** | 5 | 10 | 15 | 60 | 150 | 30 | 140 | 120 | 45 | 100 | 165 | 60 | 190 | 0 | 1090 | **5** |
| **Pre-Built Products**  **Needs Storage** | 10 | 10 | 0 | 60 | 25 | 180 | 100 | 160 | 0 | 0 | 0 | 240 | 390 | 0 | 1175 | **9** |
| **Lab Testing Facility** | 0 | 0 | 15 | 0 | 50 | 150 | 105 | 160 | 180 | 100 | 55 | 180 | 65 | 280 | 1340 | **14** |
| **Separate**  **Opening Zones** | 0 | 10 | 15 | 0 | 100 | 90 | 330 | 160 | 0 | 100 | 0 | 60 | 65 | 210 | 1140 | **8** |

**Source:** Computed Data

Table: 6 Showing the rank of challenging factors distribution providers

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **FACTORS** | **PROBLEMS APART FROM DISTRIBUTION PROVIDERS** | | | | | | | | | | | | **Total** | **Rank** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Multi-Temperature Trucks** | 9 | 36 | 54 | 36 | 60 | 126 | 105 | 144 | 135 | 60 | 33 | 72 | 870 | **4** |
| **Complete Load Flexibility** | 21 | 12 | 36 | 60 | 30 | 126 | 63 | 120 | 108 | 120 | 99 | 144 | 939 | **7** |
| **Tracking Through GPS** | 6 | 18 | 54 | 72 | 90 | 120 | 105 | 120 | 162 | 90 | 33 | 0 | 870 | **5** |
| **Complete Visibility On Status** | 12 | 30 | 36 | 12 | 105 | 162 | 147 | 48 | 162 | 30 | 66 | 72 | 882 | **6** |
| **Easy Process Of Booking** | 6 | 60 | 54 | 48 | 75 | 108 | 63 | 48 | 135 | 90 | 132 | 0 | 819 | **3** |
| **Pre- Shipment Handing** | 0 | 24 | 45 | 48 | 105 | 140 | 63 | 144 | 81 | 120 | 132 | 72 | 974 | **8** |
| **Well Trained Employees** | 9 | 0 | 45 | 50 | 75 | 90 | 105 | 72 | 108 | 180 | 198 | 108 | 1040 | **10** |
| **Fair Price** | 3 | 12 | 36 | 60 | 75 | 144 | 126 | 120 | 81 | 60 | 198 | 108 | 1023 | **9** |
| **Best Delivery Procedures** | 27 | 48 | 63 | 48 | 75 | 108 | 60 | 48 | 54 | 60 | 33 | 36 | 660 | **1** |
| **Complete Updating Of Information** | 9 | 24 | 36 | 0 | 60 | 36 | 168 | 90 | 108 | 150 | 231 | 180 | 1092 | **12** |
| **Multi Temperature**  **Storage Facilities At All The Hubs** | 9 | 18 | 36 | 84 | 45 | 72 | 0 | 144 | 130 | 180 | 132 | 180 | 1035 | **11** |
| **Holding Of Consignment By Clients Request An Any Hub** | 27 | 42 | 54 | 84 | 75 | 72 | 126 | 48 | 27 | 0 | 33 | 72 | 660 | **2** |

**Source:** Computed Data

Showing the relationship between the types of concern and types of package

Table: 7 Observed Frequency

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types Of Concern /**  **Types Of Package** | **Fibre**  **Boards** | **Crates** | **Paper &**  **Mesh Bags** | **Pallet** | **Shrink**  **Wraps** | **Palletized**  **Container** | **Total** |
| **Sole Proprietor** | 2 | 7 | 13 | 11 | 7 | 39 | **79** |
| **Partnership** | 1 | 2 | 4 | 8 | 3 | 14 | **32** |
| **Public Limited** | 0 | 0 | 0 | 3 | 2 | 0 | **5** |
| **Private Limited** | 2 | 5 | 6 | 8 | 7 | 6 | **34** |
| **Total** | **5** | **6** | **23** | **30** | **19** | **59** | **150** |

**Source:** Primary Data

**Ho :**There is no significant difference between the types of concern and types of package.

**H1 :**There is a significant difference between the types of concern and types of package**. Calculation of expected value:-**

Expected Value= Row Total \* Column Total

Grand Total

Table: 8 Expected Frequency

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types Of Concern /**  **Types Of Package** | **Fibre**  **Boards** | **Crates** | **Paper &**  **Mesh Bags** | **Pallet** | **Shrink**  **Wraps** | **Palletized**  **Container** | **Total** |
| **Sole Proprietor** | 2.6 | 7.37 | 12.11 | 15.8 | 10 | 31.07 | **79** |
| **Partnership** | 1.1 | 2.98 | 4.9 | 6.4 | 4.05 | 12.58 | **32** |
| **Public Limited** | 0.1 | 0.4 | 0.76 | 1 | 0.63 | 1.96 | **5** |
| **Private Limited** | 1.13 | 3.17 | 5.21 | 6.8 | 4.3 | 13.3 | **34** |
| **Total** | **5** | **6** | **23** | **30** | **19** | **59** | **150** |

**Source:** Computed Data

DEGREE OF FREEDOM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CALCULATED**  **VALUE** | **DF** | **LEVEL OF**  **SIGNIFICANCE** | **TV** | **SIGNIFICANT/**  **NOT SIGNIFICANT** | **NULL**  **HYPOTHESIS** |
| 21.5 | 15 | 0.05 | 24.996 | NOT SIGNIFICANT | ACCEPTED |

**Table showing the relationship between the types of concern and types of storage facility**

Table: 9OBSERVED FREQUENCY

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types Of Concern /**  **Types Of Facility** | **Reefers** | **Blast**  **Freezing** | **Freezing**  **Drying** | **Evaporative**  **Coolers** | **Trailer**  **Mounted** | **Insulated** | **Total** |
| **Sole Proprietor** | 6 | 6 | 14 | 24 | 9 | 20 | **79** |
| **Partnership** | 6 | 4 | 8 | 10 | 2 | 2 | **32** |
| **Public Limited** | 1 | 0 | 1 | 2 | 0 | 1 | **5** |
| **Private Limited** | 7 | 3 | 6 | 8 | 8 | 2 | **34** |
| **Total** | **20** | **13** | **28** | **44** | **20** | **25** | **150** |

**Source:** Primary Data

**Ho :**There is no significant difference the types of concern and types of storage facility.

**H1 : T**here is a significant difference the types of concern and types of storage facility. **Calculation of expected value:-**

Expected Value= Row Total \* Column Total

Grand Total

Table: 10 Expected Frequency

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types Of Concern /**  **Types Of Facility** | **Reefers** | **Blast**  **Freezing** | **Freezing**  **Drying** | **Evaporative**  **Coolers** | **Trailer**  **Mounted** | **Insulated** | **Total** |
| **Sole Proprietor** | 11 | 7 | 15 | 23 | 11 | 14 | **79** |
| **Partnership** | 4 | 3 | 6 | 9 | 4 | 6 | **32** |
| **Public Limited** | 1 | 0 | 1 | 1 | 1 | 1 | **5** |
| **Private Limited** | 5 | 3 | 6 | 10 | 5 | 5 | **34** |
| **Total** | **20** | **13** | **28** | **44** | **20** | **25** | **150** |

**Source:** Computed Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CALCULATED**  **VALUE** | **DF** | **LEVEL OF**  **SIGNIFICANCE** | **TV** | **SIGNIFICANT/**  **NOT SIGNIFICANT** | **NULL**  **HYPOTHESIS** |
| 21.4 | 15 | 0.05 | 24.996 | NOT SIGNIFICANT | ACCEPTED |

Table showing the relationship between the types of concern and types of technology

Table: 11 OBSERVED FREQUENCY

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types Of Concern /**  **Types Of Technology** | **Dry Ice** | **Gel**  **Packs** | **Liquid**  **Nitrogen** | **Crushed/**  **Slurry Ice** | **Quilts** | **Reefers** | **Total** |
| **Sole Proprietor** | 9 | 10 | 17 | 17 | 10 | 16 | **79** |
| **Partnership** | 4 | 7 | 2 | 8 | 5 | 6 | **32** |
| **Public Limited** | 0 | 1 | 0 | 2 | 0 | 2 | **5** |
| **Private Limited** | 3 | 2 | 3 | 7 | 4 | 15 | **34** |
| **Total** | **16** | **20** | **22** | **34** | **19** | **39** | **150** |

**Source:** Primary Data

**Ho :**There is no significant difference the types of concern and types of technology.

**H1 :**There is a significant difference the types of concern and types of technology. **Calculation of expected value:-**

Expected Value= Row Total \* Column Total

Grand Total

Table: 12EXPECTED FREQUENCY

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types Of Concern /**  **Types Of Technology** | **Dry Ice** | **Gel**  **Packs** | **Liquid**  **Nitrogen** | **Crushed/**  **Slurry Ice** | **Quilts** | **Reefers** | **Total** |
| **Sole Proprietor** | 8 | 11 | 12 | 18 | 10 | 21 | **79** |
| **Partnership** | 3 | 4 | 5 | 7 | 4 | 9 | **32** |
| **Public Limited** | 1 | 1 | 1 | 1 | 0 | 1 | **5** |
| **Private Limited** | 4 | 5 | 5 | 8 | 4 | 9 | **34** |
| **Total** | **16** | **20** | **22** | **34** | **19** | **39** | **150** |

**Source:** Computed Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CALCULATED**  **VALUE** | **DF** | **LEVEL OF**  **SIGNIFICANCE** | **TV** | **SIGNIFICANT/**  **NOT SIGNIFICANT** | **NULL**  **HYPOTHESIS** |
| 25.63 | 15 | 0.05 | 24.996 | SIGNIFICANT | REJECTED |

**Showing the relationship between the experience and goods for exports**

Table: 13 OBSERVED FREQUENCY

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Experience** | **perishable** | **medical** | **Dairy** | **Meats &**  **poultry** | **Foods**  **stuff** | **beverage** | **All the above** | **Total** |
| **Less than 3 yrs** | 1 | 2 | 0 | 0 | 0 | 2 | 2 | **5** |
| **3-5 yrs** | 5 | 1 | 1 | 2 | 2 | 1 | 32 | **44** |
| **6-10 yrs** | 3 | 3 | 2 | 2 | 5 | 3 | 24 | **42** |
| **Above 10 yrs** | 12 | 8 | 7 | 5 | 11 | 8 | 8 | **59** |
| **Total** | **21** | **12** | **10** | **9** | **18** | **14** | **66** | **150** |

**Source:** Primary Data

**Ho :**There is no significant difference between the experience and goods for exports.

**H1 :**There is a significant difference between the experience and goods for exports. **Calculation of expected value:-**

Expected Value= Row Total \* Column Total

Grand Total

Table: 14 EXPECTED FREQUENCY

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Experience** | **Perishable** | **medical** | **Dairy** | **Meats &**  **poultry** | **Foods**  **stuff** | **beverage** | **All the above** | **Total** |
| **Less than 3 yrs** | 1 | 0 | 0 | 0 | 1 | 0 | 3 | **5** |
| **3-5 yrs** | 6 | 4 | 3 | 3 | 5 | 5 | 19 | **44** |
| **6-10 yrs** | 6 | 3 | 3 | 3 | 5 | 4 | 19 | **42** |
| **Above 10 yrs** | 8 | 5 | 4 | 4 | 7 | 6 | 26 | **59** |
| **Total** | **21** | **12** | **10** | **9** | **18** | **14** | **66** | **150** |

**Source:** Computed Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CALCULATED**  **VALUE** | **DF** | **LEVEL OF**  **SIGNIFICANCE** | **TV** | **SIGNIFICANT/**  **NOT SIGNIFICANT** | **NULL**  **HYPOTHESIS** |
| 25.63 | 15 | 0.05 | 24.996 | SIGNIFICANT | REJECTED |

Table-15 shows the correlation analysis of experience and operation frequency

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **X** | **(x=37.5)** | **x²** | **Y** | **(y=37.5)** | **y²** | **Xy** |
| 5 | 32.5 | 1056.25 | 13 | 24.5 | 600.25 | 796.25 |
| 44 | -6.5 | 42.25 | 37 | 0.5 | 0.25 | -3.25 |
| 32 | 5.5 | 30.25 | 37 | 0.5 | 0.25 | 2.75 |
| 69 | -31.5 | 992.25 | 63 | -25.5 | 650.25 | 803.25 |
| **∑X=150** | **∑x=0** | **∑x²=2121** | **∑Y=150** | **∑y=0** | **∑y²=1251** | **∑xy=1599** |

**Source:** Primary Data

**r = 0.981**

Table – 16 shows the correlation analysis of package and technology

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **X** | **(x=25)** | **x²** | **Y** | **(y=25)** | **y²** | **Xy** |
| 5 | 20 | 400 | 16 | 9 | 81 | 180 |
| 14 | 11 | 121 | 20 | 5 | 25 | 55 |
| 23 | 2 | 4 | 22 | 3 | 9 | 6 |
| 30 | -5 | 25 | 34 | -9 | 81 | 45 |
| 19 | 6 | 36 | 19 | 6 | 36 | 36 |
| 59 | -34 | 1156 | 39 | -14 | 196 | 476 |
| **∑X=150** | **∑x=0** | **∑x²=1742** | **∑Y=150** | **∑y=0** | **∑y²=428** | **∑xy=798** |

**Source:** Primary Data

**r = 0.913**

**Findings, Suggestions and Conclusion**

**Findings**

* + The majority 52.6 percentage of respondents have soleproprietor.
  + The majority 46 percentage of respondents have above 10 years ofexperience.
  + The majority 49.3 percentage of the respondents major destination is Asiancountries.
  + The majority 42 percentage of respondents do based oncontact.
  + The majority 51.3 percentage of respondents do seawaytransportation.
  + The majority 31.3 percentage of respondent use cochin port fortransportation.
  + The majority 44 percentage of respondents deals with multiplegoods.
  + The majority 70 percentage of the respondents have not taken bankloans.
  + The majority 20 percentage of the respondents use pallets to pacak thegoods.
  + The majority 41 percentage of respondents use Normal(>20`c).
  + The majority 29.3 percentage of used facility is evaporativecoolers.
  + The majority 55.3 percentage of respondent deals with alldocuments.
  + The majority 26 percentage of respondents use reefertechnology.
  + The majority 26.6 percentage of respondents belongs toNCCD.
  + The majority 73 percentage of respondents use Hydro-coolingtechnique’s.
  + The majority 42 percentage of respondents faced problem is properpacking.
  + The majority 68 percentage of respondents is not aware ofSMART-TRACE.
  + The majority 43 percentage of respondents have Problems of optimization in reefer transport.
  + The rank of problems faced in export , among that the total respondents are 1st rank given toPacking.
  + The rank of factors influence the export , among that the total respondents are 1st rank given to Well Equipped StorageFacilities
  + The rank of factors affect the cold chain , among that the total respondents are 1st rank given to Pallet Temporary Storage until Flights ActualDeparture.
  + The rank of factors affecting cold chain , among that the total respondents are 1st rank given to Pre-codingFacilities.
  + The rank of problems apart from distribution provider, among that the total respondents are 1st rank given to Best DeliveryProcedures.
  + There is no significant difference between the types of concern and types ofpackage.
  + There is no significant difference the types of concern and types of storagefacility.
  + There is a significant difference the types of concern and types oftechnology.
  + There is a significant difference between experience and goods ofexport.
  + From the correlation analysis it is interpreted that there is a positive correlation between the experience and operationfrequency.
  + From the correlation analysis it is interpreted that there is a positive correlation between the package andtechnology

**Suggestions**

The frozen chain involves the transportation of temperature sensitive products along a supply chain through warm and airpackaging methods and the logistical planning to protect the integrity of these shipments. There are several means in which frozen chain products can be transported, including refrigerated trucks and railcars, refrigerated cargo ships as well as by air cargo. Though, expansion increasing but on boarding the goods managing systems may deliver even bigger savings. As there would be less accountability on drivers for setting up of the temperatures. There would be no need for the drivers to turn off the reefer to save fuel, so fuel exploitationwould be improved and conditions can be controlled slightly. The system would now decrease claims and issues such for the loss of thesales

**Conclusion**

Cargo container’s should be slightly monitored and through trending software’s make proper packing for packing flowers, fruits and vegetables for extending the life of perishable goods. New transported technologies must beimplemented for controlling and monitoring the goods. The storage facility must be enhanced with well-equipped and also in pallet storage until goods gets departure. New technique’s for pre cooling facilities and makes delivery process easy.

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